

WHAT IS CLAIMED IS:

1. A method of making a semiconductor device, comprising:  
forming a functional layer provided with a semiconductor element on a substrate with a sacrificial layer therebetween; and  
detaching the functional layer from the substrate by etching the sacrificial layer,  
the sacrificial layer including an N-type  $\text{Al}(x_1)\text{Ga}(1-x_1)\text{As}$  layer;  
the functional layer including an  $\text{Al}(x_2)\text{Ga}(1-x_2)\text{As}$  semiconductor layer,  
where  $x_1 > x_2$ ;  
at least one of hydrochloric acid and hydrofluoric acid with a concentration of 0.01% to 5% by weight being used as an etchant for the sacrificial layer; and  
the sacrificial layer being etched by the etchant while the sacrificial layer is irradiated with light.
2. The method of making a semiconductor device according to Claim 1,  $x_1$  in the sacrificial layer including the N-type  $\text{Al}(x_1)\text{Ga}(1-x_1)\text{As}$  layer, and  $x_2$  in the functional layer including the  $\text{Al}(x_2)\text{Ga}(1-x_2)\text{As}$  semiconductor layer, satisfying the relationship  $x_1 - x_2 \geq 0.1$ .
3. The method of making a semiconductor device according to Claim 1,  $x_1$  in the sacrificial layer including the N-type  $\text{Al}(x_1)\text{Ga}(1-x_1)\text{As}$  layer being 0.95 or more.
4. The method of making a semiconductor device according to Claim 3,  $x_1$  in the sacrificial layer including the N-type  $\text{Al}(x_1)\text{Ga}(1-x_1)\text{As}$  layer being 1.0.
5. The method of making a semiconductor device according to Claim 1, further comprising:  
attaching a film to the functional layer formed on the substrate, the functional layer provided with the semiconductor element being detached from the substrate in that state.
6. The method of making a semiconductor device according to Claim 1, the semiconductor element including at least one of a light-emitting diode, a surface-emitting laser, a photodiode, a high electron mobility transistor, an inductor, a capacitor, a resistor, and a heterojunction bipolar transistor.
7. The method of making a semiconductor device according to Claim 1, further comprising:  
forming an isolating groove in the functional layer, the sacrificial layer being etched in that state to detach the functional layer from the substrate.

8. The method of making a semiconductor device according to Claim 7, the isolating groove being formed by at least one of dry etching and wet etching.

9. The method of making a semiconductor device according to Claim 7, the isolating groove having a depth that reaches at least the sacrificial layer.

10. The method of making a semiconductor device according to Claim 9, the sacrificial layer being etched by placing the etchant into the isolating groove to detach the functional layer from the substrate.

11. The method of making a semiconductor device according to Claim 1, further comprising:

bonding the detached functional layer provided with the semiconductor element to a second substrate that is different from the substrate.

12. The method of making a semiconductor device according to Claim 11, the second substrate that is different from the substrate including at least one of silicon, quartz, sapphire, metal, ceramic, and plastic films.

13. The method of making a semiconductor device according to Claim 11, further comprising:

connecting the semiconductor element provided on the functional layer, which is bonded to the second substrate that is different from the substrate, to a circuit disposed on the second substrate.

14. A semiconductor element composite, comprising:

a semiconductor device fabricated by the method according to Claim 1.

15. An electro-optical apparatus, comprising:

a semiconductor device fabricated by the method according to Claim 1.

16. The electro-optical apparatus according to Claim 15, the electro-optical apparatus including a plurality of scanning lines and a plurality of data lines arrayed in a matrix, a switching device connected to the scanning lines and the data lines, and pixel electrodes connected to the switching device.

17. The electro-optical apparatus according to Claim 15, the electro-optical apparatus including a light emitting element.

18. An electronic system, comprising:

the electro-optical apparatus according to Claim 15.